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The relationship of the Korean version of the WHO Five Well-Being Index with depressive symptoms and quality of life in the community-dwelling elderly

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ABSTRACT

Background: Depression in the geriatric population is becoming markedly more prevalent. Quality of life has been linked with the development of depression. A screening tool for assessing both geriatric depression and quality of life is needed.
Objective: The purpose of this study was to assess the utility of the Korean version of the World Health Organization Five Well-Being Index (WHO-5) in evaluating geriatric depression and quality of life as compared to the widely used Short Geriatric Depression Scale of Korean version (SGDS-K).
Methods: Two hundred and forty four elderly people (>60-years-of-age) living in the Yanggu and Inje areas of Gangwon Province, Korea, were interviewed and responded to scales including WHO-5, SGDS-K, Mini Mental Status Examination in the Korean version of the CERAD assessment packet (MMSE-KC), and Geriatric Quality of Life-Dementia (GQOL-D). A total WHO-5 score < 13 indicated low well-being.
Results: The SGDS-K score showed a reverse correlation with the WHO-5, MMSE-KC, and GQOL-D scores. The WHO-5 score reversely correlated with the SGDS-K score and positively correlated with GQOL-D, but showed no significant correlation with MMSE-KC score. Subjects ranked as having poor well-being (WHO-5 score < 13) had a significantly lower GQOL-D score and a significantly higher SGDS-K score. In multiple regression analysis, WHO-5 was significantly associated with GQOL-D and SGDS-K.
Conclusion: The Korean version of WHO-5 is useful in evaluating both depressive symptoms and quality of life of community-dwelling elderly.

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1. Introduction

The global human population is aging, due to an overall diminished birthrate and rising life expectancy (Lee et al., 1999). As well, geriatric depression is becoming more prevalent, although many elderly depressed patients remain undetected and untreated (Bonsignore et al., 2001). Caregivers can also suffer from depression (Kee and Kim, 2003). More effective means of recognition and therapy would boost the quality of life (QOL) of all those affected and would likely reduce attendant medical expenses (George, 2001).

In many people, interest in alleviating depression also involves the desire to improving their QOL including remediating anxiety. Depression has been conclusively linked with QOL, with more exacerbated depression linked with a more markedly diminished QOL (Olfson et al., 1997; Pyne et al., 1997; Rapaport et al., 2005).

Improvements in QOL require better means of assessing QOL (Heun et al., 1999; Huber et al., 1988). The concept of the QOL refers to a subjective experiences on one hand and an approach to health and disease on the other hand, which includes psychological, physical, and social aspects (Heun et al., 1999). Subjective QOL of each individual can be evaluated by the degree of how they feel about psychological well-beings. Therefore, the World Health Organization (WHO) (Angst, 1999) developed the WHO Well-Being Scale that was short and could be used quickly by the patient (Heun et al., 1999).

The WHO Well-Being Scale was initially developed to evaluate the quality of care for diabetes (Awata et al., 2007b; Bonsignore et al., 2001). The design of the question was based on Zung's self-rating scales for depression, anxiety, and psychological distress (Bonsignore et al., 2001). The first version of Well-Being Index consisted of 28 items (Bradley, 1994). Additional psychometrical analyses were proposed. Bech et al. (1996) first proposed a further shortened version of 10 items in 1995, five items in the same year

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(Bech), and finally a reviewed version of the WHO-5 in 1998 (World Health Organization, 1988). We chose the final version of the WHO-5. Some brief scales have been designed to evaluate depression other than WHO-5. These included the B-PHQ (Brief Patient Health Questionnaire), GHQ-12 (General Health Questionnaire) (Henkel et al., 2003). Among the three brief questionnaires, the WHO-5 shows significantly greater sensitivity and better negative predictive value (Primack, 2003).

Previously used tools for elderly depression were Hamilton Rating Scale for Depression (HRS-D), the Center for Epidemiologic Studies Depression Scale (CES-D), and Geriatric Depression Scale (GDS). This study compares WHO-5 with the Short Geriatric Depression Scale-Korean version (SGDS-K) for depression.

Cognitive impairment in older adults is very common (Park et al., 2003). Cognitive functions influence depressive symptoms, which have also been conclusively associated with cognitive status (Lee and Shinkai, 2005). Depressive symptoms in aged people may be associated with the risk of the development of Alzheimer's disease (Devanand et al., 1996; Wilson et al., 2004). In several studies of elderly subjects, the presence of depressive symptoms was regarded as a predictive factor indicating more rapid cognitive declination (Wilson et al., 2002; Wilson et al., 2004; Yaffe et al., 1999).

The utility of WHO-5 in the elderly with cognitive impairment has not been well studied. Several reports showed that the association of well-being index with cognition was controversial (Awata et al., 2007b; Heun et al., 1999).

Consequently, the first aim of the present study was to evaluate the usefulness of Korean version of WHO-5 related to depression and QOL. The second one was to examine the correlation of WHO-5 with cognition.

2. Subjects and methods

2.1. Subjects

Target subjects for this study were 244 participants of a population based project designed to screen community dwelling elderly older than 65 years for the early detection of depression and dementia in the Yanggu and Inje areas in Gangwon Province. The study subjects were consecutively selected among those who visited local health care clinics for the evaluation of their depressive symptom and cognitive function and gave approval for this study. Those who refused or had physical disabilities that interfered with the interview were excluded.

2.2. Procedures

The interviewers were medical students who were well trained by a psychiatrist about the survey before beginning the interview process. They had a face-to-face talk after explaining interview process to all subjects. The elders in the community were instructed to appoint a place for the interview. This study was approved by the institutional review board of the Chuncheon Sacred Heart Hospital.

2.3. Measures

2.3.1. WHO-5 (WHO Five Well-Being Index) translated to Korean

Direct translation of the original WHO-5 was done by two bilingual neuropsychologists. Next, back translation was attempted with Korean translated version by two professional translators who were not shown the original English version. Then the back translation and the original English version were compared with each other. As a result, some items of the first Korean version were modified as they were considered to be better than the meaning of the original items in WHO-5. The contents of the final Korean version of WHO-5 were further verified by back translation procedure until the meaning of each item matched closely with the original one.

Each item of WHO-5 indicates the degree of positive well-being during the past 2 weeks on six points from 0 (at no time) to 5 (all of the time), and the total score ranged from 0 to 25, with high scores indicating the optimal well-being (Awata et al., 2007b). In previous studies, WHO-5 had enough discriminatory validity as a screening tool for the detection of depressive episode and its standard cut-off point of <13 had an excellent sensitivity/specificity trade-off (Awata et al., 2007b). We defined a score exceeding 13 as indicating high well-being group and scores < 13 as the low well-being group. The inter-rater reliability was 0.8.

2.3.2. MMSE-KC (Mini Mental Status Examination in the Korean version of the CERAD assessment packet)

MMSE is a dementia screening tool that is used globally. We can evaluate the degree of cognitive impairment (Folstein et al., 1975) and the repetitive performance of this scale can clarify the change of cognitive function (Folstein et al., 1975). The MMSE consists of 30 items that examine orientation, memory registration, memory recall, attention, language function, understanding, and judgment. Cognitive function was evaluated using the MMSE-KC (Lee et al., 2002). The correlation of WHO-5 with MMSE-KC and effect of MMSE-KC on WHO-5 were examined.

2.3.3. GQOL-D (Geriatric Quality of Life-Dementia)

We used the GQOL-D scale to measure the QOL. The scale consists of 15 items and is a brief form of the Geriatric Quality of Life (GQOL) scale (Korean Association for Geriatric Psychiatry, 2003). It has been verified that the correlation between each item of the GQOL-D scale and each QOL question is significant, and also with scales for measuring cognitive function, feeling of well-being, behavior, and daily activity that this scale can be a useful one (Lee et al., 2003). Therefore, the GQOL-D scale showed a similar pattern with the GQOL scale that is applied to normal elderly people (Huh et al., 2008). The scale consists of 15 items. Each item scores the satisfaction of the patients from 1 to 4. Total points range from 15 to 60 points. We studied whether this scale could be used to measure the QOL and even depression, considering that there is close relationship between depression and QOL.

2.3.4. SGDS-K (Short Geriatric Depression Scale of Korean version)

Elderly people can often show hostile reactions toward psychiatric measurement (Salzman and Shader, 1978). Weakened physical ability and cognitive functions can impair concentration for extended periods of time. Therefore, scales that are easier to understand and easy to answer are needed (Cho et al., 1999).

Considering these facts, Sheikh and Yesage (1986) presented the SGDS, which is composed of 15 items having similar capability of measurement comparing 30 items of GDS, considering specificity and sensitivity. Korean GDS and SGDS have been widely used with validity. GDS-K and SGDS-K have high internal unanimity and reliability comparing to existing depression scales: Hamilton Rating Scale for Depression (HRS-D), The Center for Epidemiologic Studies Depression scale (CES-D) (Bae and Cho, 2004). In SGDS-K, the optimal cut-off point to detect depression was selected as 8 points. Sensitivity was 94% and specificity was 73% (Cho et al., 1999). Presently, we considered groups who scored ≥ 8 and <8 as depressed and non-depressed, respectively.

2.4. Statistical analyses

All statistical analyses were performed using Database Graphics Statistics, version 4.5. A p-value < 0.05 was considered significant.

Demographic data was collected and correlation analysis was used to determine the correlation between each measurement scales. The *t*-test was used to compare the total points of high well-being group, poor well-being group, depressed group, and the non-depressed group measured with each scale. Multiple regression analysis was used to find out the effects of other measurement scales on SGDS-K and WHO-5.

3. Results

3.1. Statistical data of the population

The mean age of the 244 elderly people (65 men, 179 women) was 73.04 years (range 62–92 years). Of the 244 subjects, 156 were married, 82 were widows/widowers, six were not married. The subjects averaged 3.18 ± 3.33 years of education. The average score of MMSE-KC scale, SGDS-K, and GQOL-D scale was 21.76 ± 5.01, 4.06 ± 3.53, and 36.12 ± 8.07, respectively. The WHO-5 scale averaged 14.67 ± 6.96 points (Table 1). In our study, MMESE-KC mean score was nearly 22. MMSE-KC score 22 in Korean male or female (73 years) with 3.2 education year represents −1.1 *Z*-score (13.6 percentile) (male; mean 24.6 ± 3.3) and −0.4 *Z*-score (nearly 34 percentile) (female; mean 22.5 ± 3.9). Normally *Z*-score < −2.0 (below 3 percentile) indicate dementia in MMSE-KC screening test.

3.2. Correlation between each scale

SGDS-K showed a significant reverse correlation between WHO-5, MMSE-KC, and GQOL-D ($p < 0.05$). WHO-5 showed a significant correlation between GQOL-D ($p < 0.5$), a reverse correlation between SGDS-K ($p < 0.05$), and no correlation between MMSE-KC.

3.3. Difference of the total scores of each scale for the high well-being and low well-being groups

Total scores of MMSE-KC, SGDS-K, and GQOL-D for the high and low well-being groups were compared. Total SGDS-K scores were 2.72 ± 2.52 for the high well-being group and 6.67 ± 3.76 for the low well-being group. There was a significant difference in the total scores between the two groups ($t = 1.98$, $p < 0.001$). The total scores of GQOL-D were 38.48 ± 7.66 for high well-being group and 31.55 ± 7.66 for low well-being group. There was a significant difference in the total scores between the two groups ($t = 1.97$, $p < 0.001$). The total scores of MMSE-KC were 21.98 ± 4.81 for the high well-being group and 21.34 ± 5.39 for the low well-being group. There was no significant difference in the total scores between the two groups ($t = 1.97$, $p = 0.34$) (Table 2).

Table 1
Sociodemographic and psychological variables of 244 subjects.

N	244
Mean age, years (mean ± SD)	73.0 ± 6.60
Gender (%)	
Male	26.6
Female	73.4
Marital status (%)	
Married	64.8
Bereavement	34.8
Single	0.4
Duration of education, years (mean ± SD)	3.18 ± 3.33
MMSE-KC score (mean ± SD)	21.8 ± 5.01
SGDS-K score (mean ± SD)	4.06 ± 3.53
GQOL-D score (mean ± SD)	36.1 ± 8.07
WHO-5 score (mean ± SD)	14.7 ± 6.96

MMSE-KC, Mini Mental Status Examination in the Korean version of the CERAD assessment packet; SGDS-K, Short Geriatric Depression Scale of Korean version; GQOL-D, Geriatric Quality of Life Dementia; WHO-5, WHO-Five Well-Being Index.

Table 2
Differences of scores between high well-being group and low well-being group.

Variables	WHO-5		*t*	*p*-Value
	High well-being group (WHO-5 ≥ 13) (*n* = 161)	Low well-being group (WHO-5 < 13) (*n* = 83)		
MMSE-KC (SD)	21.98 (4.81)	21.34 (5.39)	1.97	0.34
SGDS-K (SD)	2.72 (2.52)	6.67 (3.76)	1.98	0.00*
GQOL-D (SD)	38.48 (7.66)	31.55 (7.66)	1.97	0.00*

WHO-5, WHO-Five Well-Being Index; MMSE-KC, Mini Mental Status Examination in the Korean version of the CERAD assessment packet; SGDS-K, Short Geriatric Depression Scale of Korean version; GQOL-D, Geriatric Quality of Life Dementia.
* $p < 0.05$, statistical significance was tested by *t*-test.

3.4. Association between SGDS-K and GQOL-D, and WHO-5

When stepwise multiple regression was done with WHO-5 as a dependent variable, both SGDS-K ($\beta = -0.77$, $t = 5.27$, $p = 0.00$) and GQOL-D ($\beta = 0.20$, $t = 3.13$, $p = 0.00$) showed significant association with WHO-5. Age and sex were controlled. As a result, regression analysis was statistically significant ($r^2 = 0.29$, $F = 2.42$, $p = 0.00$) (Table 3).

3.5. Difference of total scores between the depressed group and non-depressed group using each scale

The non-depressed group ($n = 204$) outnumbered the depressed group ($n = 40$). *t*-Test was used to compare the scores between the two groups. Using each scale, a significant difference was evident between the two groups, with MMSE-KC ($t = 1.97$, $p < 0.001$), GQOL-D ($t = 1.97$, $p < 0.001$), and WHO-5 ($t = 1.97$, $p < 0.001$) (Table 4).

3.6. Association between MMSE-KC, WHO-5, and GQOL-D, and SGDS-K

When stepwise multiple regression was performed with SGDS-K as a dependent variable, MMSE-KC ($\beta = -0.12$, $t = 2.99$, $p = 0.00$), WHO-5 ($\beta = -0.15$, $t = 5.22$, $p = 0.00$) and GQOL-D ($\beta = -0.18$, $t = 6.73$, $p = 0.00$) were significantly associated with SGDS-K. Age and sex were controlled. As a result, regression analysis was statistically significant ($r^2 = 0.41$, $F = 2.26$, $p = 0.00$)(Table 5).

4. Discussion

Well-being comprises psychiatric states. WHO-5 has been validated as an effective scale to estimate the extent of depressive disorders (Bonsignore et al., 2001; Henkel et al., 2004a; Henkel et al., 2004b; Henkel et al., 2003; Inagaki et al., 2013), anxiety disorders (Bonsignore et al., 2001), health-related QOL (Bech et al., 2003), and psychiatric disorders (Heun et al., 1999). So we studied its effectiveness in a Korean population.

In line with previous studies, the scale was presently inversely correlated significantly with depression. The difference of SGDS-K

Table 3
The influence of SGDS-K and GQOL-D on WHO-5.

	Variables	β	*t*	r^2	*p*-Value
WHO-5	Sex	−0.35	0.38	0.29	0.70
	Age	0.07	1.26		0.20
	SGDS-K	−0.77	5.27		0.00*
	GQOL-D	0.20	3.13		0.00*

WHO-5, WHO-Five Well-Being Index; SGDS-K, Short Geriatric Depression Scale of Korean version; GQOL-D, Geriatric Quality of Life Dementia.
* $p < 0.05$, statistical significance was tested by stepwise multiple regression analysis.

Table 4
Differences of scores between depressed group and non-depressed group.

Variables	SGDS-K		*t*	*p*-Value
	Depressed group (SGDS-K ≥ 8) (*n* = 40)	Non depressed group (SGDS-K < 8) (*n* = 204)		
MMSE-KC (SD)	19.35 (5.43)	22.24 (4.80)	1.97*	0.00*
GQOL-D (SD)	28.30 (8.16)	37.66 (7.96)	1.97*	0.00*
WHO-5 (SD)	7.65 (6.10)	16.04 (6.26)	1.97*	0.00*

SGDS-K, Short Geriatric Depression Scale of Korean version; MMSE-KC, Mini Mental Status Examination in the Korean version of the CERAD assessment packet; GQOL-D, Geriatric Quality of Life Dementia; WHO-5, WHO-Five Well-Being Index.
* $p < 0.05$, statistical significance was tested by *t*-test.

between the high well-being group and the low well-being group was appreciable. These results suggested the potential of WHO-5 as a depression screening tool, and repeated the findings of another study (Bonsignore et al., 2001; Lucas-Carrasco, 2012). Previous studies reported that the WHO-5 is effective in detecting depressive disorders in patients of all ages, let alone elderly people, visiting primary care patients (Henkel et al., 2004a; Henkel et al., 2003; Primack, 2003; Saipanish et al., 2009). Previous studies have focused on patients visiting primary care is that a lot of depressed patients seek primary care prior to specialized psychiatric hospital (Paykel et al., 1997).

We next studied the relationship between WHO-5 and QOL using GQOL-D. This study revealed that WHO-5 positively correlated with GQOL-D. To clarify the effectiveness of WHO-5, many studies have focused on the relationships between the degree of well-being and depression, anxiety, and suicide attempts. However, no study has directly examined the relationship between the WHO-5 scale and QOL. The present study is the first to examine the relationship between WHO-5 and QOL, and was done using a specific assessment of well-being, the GQOL-D scale.

There was no relationship between WHO-5 and cognitive function. SGDS-K significantly correlated with MMSE-KC but WHO-5 had no correlation with MMSE-KC. These results show that the deterioration of cognitive function affects the SGDS-K score but not the WHO-5 score. Similarly, in a previous study there was no correlation between WHO-5 and MMSE, and all subject were characterized as having relatively high cognitive function (Awata et al., 2007b). However, another study reported a significant correlation between MMSE and WHO-5 indicating that the two scales might be correlated, because patients with chronic disease had a lower QOL (Heun et al., 1999). Further studies are needed to validate the present results.

The WHO-5 scale has been translated into various languages (http://www.who-5.org). However, it has not been translated into Korean and no data has yet been published in Korea. Presently, WHO-5 showed its usefulness in studying the relationship between depression and QOL. Using only two of the five items from WHO-5 enables the differentiation of disorders that have depressive symptoms (Henkel et al., 2004a). In studies that considered subject characteristics, WHO-5 was effective at detecting depression of females and elderly compared to other groups (Henkel et al., 2004a). WHO-5 reportedly has high reliability and validity in screening for depression of diabetes patients (Awata et al., 2007b), patients with acne (Henkel et al., 2003), and depression in nursing home (Allgaier et al., 2013; Allgaier et al., 2011). WHO-5 has also proven useful to predict suicidal ideation (Awata et al., 2007a) and the risk of a suicide attempt (Sisask et al., 2008). This level of subjective feeling of well-being can provide data that can help to prevent suicide (Hegerl and Althaus, 2003). We only studied elderly patients, but WHO-5 can be extended to all ages to study the depression and QOL with different disorders in different environment.

Table 5
The influence of MMSE-KC, GQOL-D and WHO-5 on SGDS-K.

	Variables	β	*t*	r^2	*p*-Value
SGDS-K	Sex	−0.19	0.44	0.41	0.66
	Age	−0.00	0.11		0.97
	MMSE-KC	−0.12	2.99		0.00*
	WHO-5	−0.15	5.23		0.00*
	GQOL-D	−0.18	6.73		0.00*

SGDS-K, Short Geriatric Depression Scale of Korean version; MMSE-KC, Mini Mental Status Examination in the Korean version of the CERAD assessment packet; WHO-5, WHO-Five Well-Being Index; GQOL-D, Geriatric Quality of Life Dementia.
* $p < 0.05$, statistical significance was tested by stepwise multiple regression analysis.

The study has several limitations. We compared the SGDS-K scores to study the relationship with depression and did not use diagnosis of depression by criteria of DSM-IV or ICD-10. Second, the cut-off point in determining the high well-being group and low well-being group was 13 points, as used in previous studies, which had not been tested in Korea. Further study is needed to determine the cutting point which could be applied to Koreans. Third, the study subjects consisted of 73.4% female and 26.6% male. The Yanggu and Inje are located in Gangwon Province. Gangwon Province is a rural area in which the proportion of elderly (above 65 years old) is larger and female elderly predominates because female usually lives longer than male in Korea. Thus, there is a limit of the results of our study to generalize.

5. Conclusions

The Korean version of WHO-5 represents depression as in previous studies done in foreign countries, and subjective well-being correlates with QOL. Therefore, it is very useful in evaluating both depressive symptoms and QOL of community dwelling elderly.

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Contributors

Do Hoon Kim conceptualized and designed the study. Hyun Ji Kim analyzed the data and made first draft of this study. Yoo Sun Moon wrote and revised the manuscript.

Conflict of interest

The authors have no conflict of interest to declare.

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